CONSTRUCTION TECHNOLOGY: ELECTRICAL II

Construction Technology: Electrical II includes classroom and laboratory experiences concerned with the practice of residential wiring, including electrical service, metering equipment, lighting, switches, outlets and other common components, and methods of installation and maintenance of the residential wiring system in accordance with the current National Electrical Code. Additionally, it presents methods and techniques for troubleshooting appliances, motors, motor controls, relay wiring, commercial wiring and industrial wiring systems. It also covers wiring methods and material selection for commercial and industrial wiring systems. Studies include mechanical installation of hardware as well as electrical design and layout. Focuses on tool use, material selection, and installation of machines in the industrial setting. Instruction in thinking critically and independently analyzes, synthesize, and evaluate technical problems and information. Identify and interpret health, safety, and welfare standards and codes as dictated by local, state or Federal agencies

- DOE Code: 4832
- Recommended Grade Level: Grade 12
- Recommended Prerequisites: Construction Technology: Electrical I
- Credits: 2-3 credits per semester, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- This course is aligned with postsecondary courses for Dual Credit:
    - Ivy Tech
        - BCOT 129 – Residential Wiring
        - BCOT 220 – Electrical Troubleshooting Techniques
        - BCOT 222 – Commercial/Industrial Wiring

Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in SkillsUSA, the CTSO for this area.

Content Standards

Domain – Residential Wiring

Core Standard 1 Students apply and adapt wiring concepts in residential electrical projects to ensure compliance with National Electrical Code.

Standards

ETII-1.1   Select wire and devices according to code

ETII-1.2   Design and install typical service entrance

ETII-1.3   Draw a wiring diagram based on a set of blueprints, specifications and code requirements

ETII-1.4   Apply critical thinking skills to technical problems and information

ETII-1.5   Identify and interpret health, safety, and welfare standards as dictated by local, state or federal agencies

Domain – Electrical Troubleshooting Techniques

Core Standard 2 Students employ wiring concepts to solve electrical problems in generators and alternators.

Standards

ETII-2.1   Explain operating principles of DC generators

ETII-2.2   Examine single phase AC generation principles

ETII-2.3   Examine physical and electrical characteristics of three phase alternators

ETII-2.4   Perform wiring procedures for alternators

Core Standard 3 Students apply wiring concepts to solve electrical problems in transformers.

Standards

ETII-3.1   Examine basic principles of transformers

ETII-3.2   Examine single phase transformers connected in Delta

ETII-3.3   Explain Wye and Delta connections of single phase transformers

ETII-3.4   Install instrument transformers

ETII-3.5   Examine the role of three phase transformers

ETII-3.6   Understand National electrical code requirements for transformers installations

Domain – Commercial/Industrial Wiring

Core Standard 4 Students apply and adapt wiring processes to all commercial/industrial electrical projects to ensure compliance with the National Electrical Code.

Standards

ETII-4.1   Read blueprints, interpret drawings, understand specifications, and the NEC when installing an industrial wiring system

ETII-4.2   Install, service, and repair electrical circuits and controllers in the industrial setting

ETII-4.3   Size conductors for each application

ETII-4.4   Identify proper machine hook-up from plans

ETII-4.5   Install commercial light fixtures

ETII-4.6   Provide protection for wiring in industrial work areas

ETII-4.7   Identify safety problems in the industrial areas

ETII-4.8   List hardware needed

ETII-4.9   Select tools needed for each job

Common Core Literacy Standards for Technical Subjects

Reading Standards for Literacy in Technical Subjects 11-12

The standards below begin at grade 11 and define what students should understand and be able to do by the end of grade 12. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad standards, the latter providing additional specificity.

Key Ideas and Details

11-12.RT.1   Cite specific textual evidence to support analysis of technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

11-12.RT.2   Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

11-12.RT.3   Follow precisely a complex multistep procedure when performing technical tasks; analyze the specific results based on explanations in the text.

Craft and Structure

11-12.RT.4   Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific context relevant to *grades 11-12 texts and topics*.

11-12.RT.5   Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

11-12.RT.6   Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

Integration of Knowledge and Idea

11-12.RT.7   Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

11-12.RT.8   Evaluate the hypotheses, data, analysis, and conclusions in a technical subject, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

11-12.RT.9   Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Range of Reading and Level of Text Complexity

11-12.RT.10   By the end of grade 12, read and comprehend technical texts in the grades 11-CCR text complexity band independently and proficiently.

Writing Standards for Literacy in Technical Subjects 11-12

The standards below begin at grade 11 and define what students should understand and be able to do by the end of grade 12. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad standards, the latter providing additional specificity.

Text Types and Purposes

11-12.WT.1   Write arguments focused on *discipline-specific content*.

11-12.WT.2   Write informative/explanatory texts, including technical processes.

11-12.WT.3   Students will not write narratives in technical subjects. *Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In technical, students must be able to write precise enough descriptions of the step-by-step procedures they use in their technical work that others can replicate them and (possibly) reach the same results.*

Production and Distribution of Writing

11-12.WT.4   Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

11-12.WT.5   Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

11-12.WT.6   Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

11-12.WT.7   Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

11-12.WT.8   Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectivity to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation

11-12.WT.9   Draw evidence from informational texts to support analysis, reflection, and research.

Range of Writing

11-12.WT.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.